A Report on a Culture of *Phasma gigas* from New Ireland

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Abstract
A report of a culture of *Phasma gigas* found in New Ireland, brought into the UK and bred by Stan Pack. This paper gives details of the phenotype of the male and female, their life cycle, and number of eggs produced.

Key words
Phasmida, *Phasma gigas*, New Ireland, Descriptions, Male, Female, Eggs, Life Cycle, Defence, Rearing.

Introduction

The culture of *Phasma gigas* discussed here originates from a batch of eggs that was brought back from Kavieng, New Ireland, an island within the Bismark Archipelago some 400 miles north of the Papua New Guinea mainland, by a individual who was working in the country. These were passed on to Stan Pack who, with the help of other members of the Phasmid Study Group, proceeded to breed them efficiently and pass them on to other members. There are currently two phenotypes of *Phasma gigas* in culture, the original culture bred by Stan Pack and another that was bought as a batch of eggs by Allan Harman and Ian Abercrombie, which originated from Wau, in the Marobi Province of Papua New Guinea. The culture established by Ian and Allan appears easier to breed than Stan's, with a much lower 1st instar death rate of around 30%. They are almost identical apart from the fact that Ian and Allan's *Phasma gigas* is more spinulose on the dorsal surface of the thorax. The culture described here is the one introduced by Stan Pack.

Distribution of *Phasma gigas*

As one of the oldest known, and one of the largest species of phasmid, *P. gigas* has been recorded many times (see below), although many of the pre-1900 mentions are only reiteration of earlier publications rather than new records. Since few phasmids were known until the mid-1800s some of the early records may relate to misidentified material, consequently some early records may be incorrect. When taken in conjunction with the unreliable and vague locality records of some old material, it is not surprising that the recorded distribution of this species appears to cover a much wider area than recent records suggest. The recorded distribution includes many of the islands east of the Wallace Line, from Sulawesi to New Guinea and New Britain; records for Java, Sumatra and Borneo (Redtenbacher, 1908: 467) are rather suspect. I have done a lot of work on Bornean material and have never located a specimen from Borneo, the record (based on a specimen in Budapest museum - now destroyed - Redtenbacher, 1908)) is almost certainly an error. Similarly, Java and Sumatra were important trading areas in the 19th century, material collected elsewhere could easily have been sent on from Java or Sumatra without any original data.

The inadequate descriptions of early species has led to various opinions about synonyms of this species. The following synonymy is in many ways no more than my best guess, based on synonymies given by other authors: I have not examined the original specimens.

Phasma gigas (Linnaeus, 1758)

Gryllus (Mantis) gigas, Linnaeus, 1758: 425; Linnaeus, 1766: 689. Syntypes ♂, nymph (UZIU) Amboina.

Gryllus gigas (Linnaeus); Shaw, 1790-1813: pl. 43 [not seen].

Mantis gigas (Linnaeus); Fabricius, 1775: 14; Olivier, 1792: 625; Donovan, 1800: pl. 9 (♀).

Phasma gigas (Linnaeus); Stoll, 1813: 1, pl. 1.1 (♀) & 6, pl. 2.5 (♀); Thunberg, 1815: 296; Fabricius, 1798: 187; Lichtenstein, 1802: 11; Cuvier, 1845: pl. 80 (♀); Burmeister, 1838: 579; Beauvois, 1805: 109, pl. 13.1 (♀); Kirby, 1904b: 390; Günther, 1933: 159; Herwaarden, 1998: 86, fig 11.1 (♂).

Spectrum gigas (Linnaeus); Lamarck, 1817: 254.

Phasma (Cyphocrania) gigas (Linnaeus); de Haan, 1842: 129, pl. 14.3.

Cyphocrana gigas (Linnaeus); St Fargeau & Serville, 1825: 445; Serville, 1831: 60; Gray, 1835: 35; Blanchard, 1840: 15.

Cyphocrania gigas (Linnaeus); Burmeister, 1838: 579; Westwood, 1859: 106; Kaup, 1871: 21, pl. 1.17 (egg); Redtenbacher, 1908: 467, pl. 23.9.

Cyphocrania gigas var.; Westwood, 1859: 107. [Synonymised with *P. empusa* by Kirby, 1904b: 391.]

Phasma necydaloides Thunberg, 1815: 296 [not *P. necydaloides* Stoll, 1813]. Synonymised by Kirby, 1904b: 390.

Phasma empusa Lichtenstein, 1796: 77; Lichtenstein, 1802: 12; Kirby, 1904a: 439; Kirby, 1904b: 390. Synonymised by Redtenbacher, 1908: 467.

Cyphocrana empusa (Lichtenstein); Gray, 1835: 35; Serville, 1838: 237.

Cyphocrania empusa (Lichtenstein); Burmeister, 1838: 579.

Cyphocrana bauvoisi Serville, 1831: 60 [Replacement name for *Phasma gigas* Beauvois, 1805: 109, pl. 13.1 (not Linnaeus, 1758)]. Synonymised with *P. gigas* by Redtenbacher, 1908: 467.

Cyphocrania beauvoisii Serville [corrected spelling of *bauvoisi*]; Burmeister, 1838: 579; Westwood, 1859: 108.

Eurycnema (?) beauvoisi (Serville); Kirby, 1904b: 392. [emended spelling].

? *Cyphocrania goliath* var. de Haan, 1842: 128. Given as a possible synonym by Redtenbacher, 1908: 467.

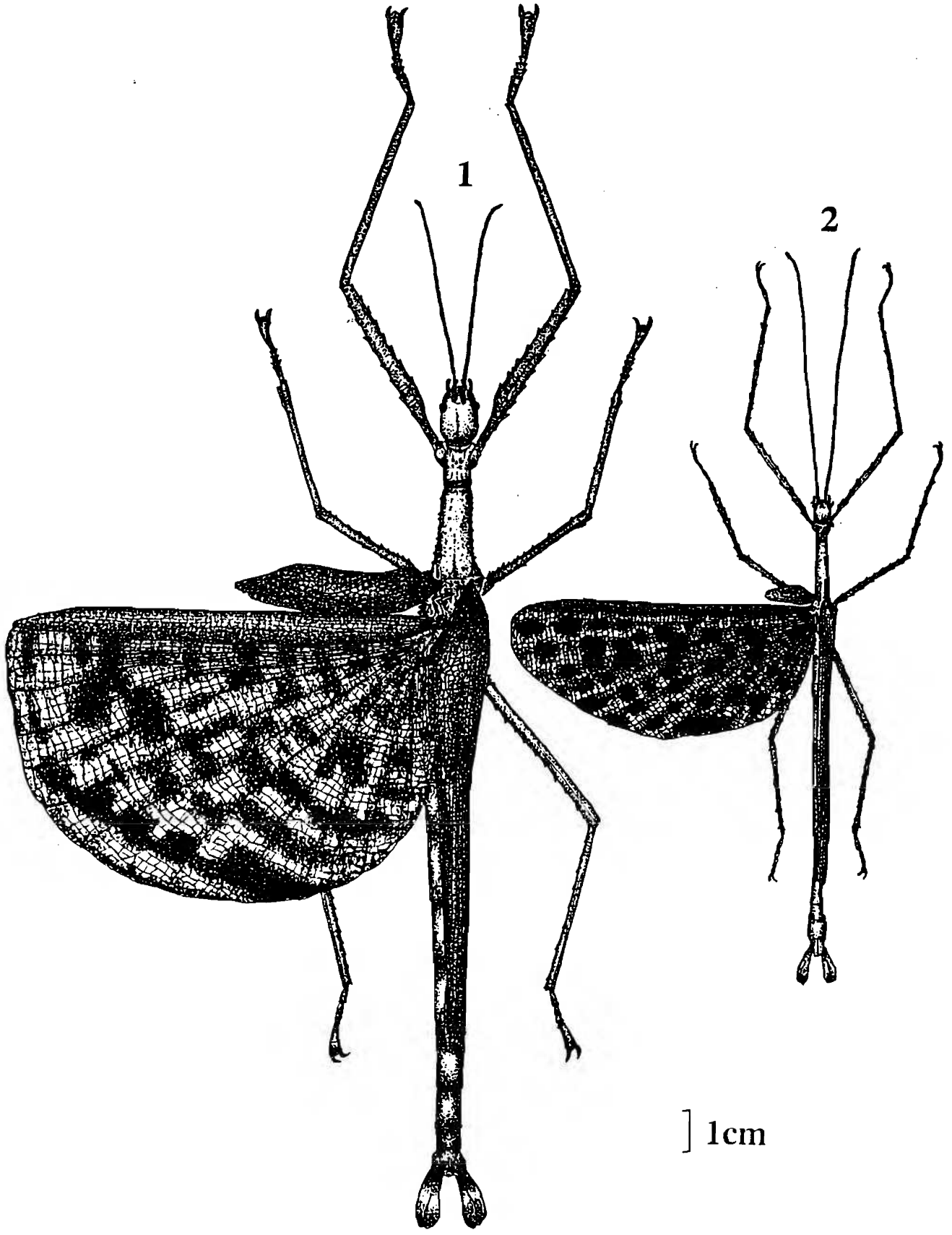
[Redtenbacher, 1908: 460 treated *Mantis necydaloides* Linnaeus as a junior synonym of *Anchiale maculata* (Olivier, 1792)]

Description of the male (Figure 2)

My male of *Phasma gigas* measured 114mm long. It has a typical body shape of an insect of the genus *Phasma*, and is very similar in shape to *Acrophylla* spp. The mesothorax is dentate, with small projections covering the dorsal and ventral surface. The carinae of the legs are serrated with medium-sized spines, which are irregularly spaced along the length of both the femur and tibia of all the legs. The antennae of the male are 60mm long, and are covered with a dense layer of sensory hairs. The head of the male is almost spherical, being 4mm wide and 5mm long. The male exhibits large compound eyes, as well as large ocelli. The elytra are very small (13mm long) and exhibit a very pronounced longitudinal ridge, which is also found in other members of Phasmatidae. The hind-wing of the male almost covers the length of the abdomen, reaching to the base of the 7th abdominal segment, with the costal margin of the wing being a very light brown colour. The wingspan of the male is 77mm, with the wing exhibiting a dark chequered pattern, as found in certain winged members of Phasmatidae, such as *Acrophylla titan* and *Acrophylla wuelfingii*. At the tip of the abdomen, there is a large bulbous projection, comprising of the 9th abdominal segment, the anal segment and the subgenital plate. The cerci of the male are very pronounced, are 8-9mm long, and are paddle-shaped with a distinct keel along the dorsal surface. The external genitalia of the male are very pronounced, with the poculum of the male having a large bump on the ventral surface.

Description of the female (Figure 1)

My female of *Phasma gigas* measured 193mm long and, like the male, it has a typical body shape of the genus Phasma. The mesothorax is dentate, with small projections over both the dorsal and ventral areas. Like the male, the carinae of the legs are heavily serrated with large spines, which the female uses in her defensive routine. Unlike the male, the female's antennae are 48mm long, and do not exhibit the sensory hairs to any great degree, although some are still present. The female's head is much more oval than the male, with a length of 14mm, with smaller compound eyes in ratio to the head size. The female has ocelli as the male does, but they are much smaller in relation to the size of her head. The elytra of the female are much bigger in comparison to the male, reaching down to the base of the 2nd abdominal segment. The hind-wings of the female are 110mm long, and are patterned in the



Figures 1-2. *Phasma gigas*: **1.** Female, **2.** Male.

same way as the males, but are much darker. The ventral surface is a light brown colour. Although the female has large wings she cannot fly as well as the male can, but was observed to glide short distances. The female has large paddle-shaped cerci with a length of around 13mm.

Description of the egg

The egg of *Phasma gigas* is around 4mm long. The surface of the egg is a mottled brown colour, and upon closer inspection by means of a microscope, there are dark spots covering the surface of the egg. The micropylar plate extends along the dorsal area of the egg, and is around 3mm long. The micropyle of the egg is situated at the base of the plate. The surface of the egg is covered with small dents, resembling the surface of a golf ball, and small vein-like projections are scattered over the surface of the egg, including the micropylar plate.

Life Cycle and Rearing

The eggs take approximately 6 months to hatch at 20°C and 60% humidity. At these settings, there is a hatch rate of 60-70%. If kept too humid, many of the eggs will not hatch due to bacterial and fungal infection. I found that the best way to keep the eggs was to use a 2:1 substrate ratio between fine grain vermiculite and sifted peat that had been heated in a oven beforehand to kill small insects and possible bacteria. The substrate and eggs should then be sprayed lightly daily and kept at a temperature of 20°C. The 1st instar nymph is approximately 11mm long and a bright green. At this stage, many of the nymphs die for various reasons, with a survival rate of 40-50% depending on the conditions they are kept in. Surviving nymphs will moult roughly each month, increasing their length by approximately $^1/_3$ each time. It is difficult to tell the male and female nymphs apart when they are small, but once they reach the 3rd and 4th instar, the males become easy to identify as they have a large bump situated on the ventral surface of the abdomen at the tip. Nymph fatalities are often high in the early stages (almost 60%), and many methods have been tried to reduce this. The most successful so far has been to keep the nymphs at 40-50% humidity, with air circulation through the cage, which can be provided by a small fan easily purchased at hardware stores. Care must be taken if cold water is used to spray the foodplant, the nymphs may chill if they become wet and the fan is on - I found that tepid water worked best, with half an hour allowed for the water to evaporate before putting the fan on again. The most accepted foodplants are *Rosa* sp., *Quercus* sp., *Eucalyptus* sp. and Bramble. The wing buds become pronounced towards the 5th instar, but the adult coloration of the wings is not present until approximately a week before the final moult. The adults are fairly long lived, surviving roughly 7 months, with the females laying 300-400 eggs in their life-span.

Defences

The nymphs of *Phasma gigas* have little defence from predators, with their main method being to remain hidden in undergrowth, but when disturbed they will move rapidly for a short distance to evade the would-be predator. Another form of defence, particularly if handled roughly, is that they are prone to losing legs and because of this great care they should be take when handling young nymphs. As they reach the 5th instar they become more aggressive, using their spiny legs to scratch the handler, and moving in such a way that they risk falling from the handler's hands. The adults have many more methods of protecting themselves compared to the nymphs. Adult males will remain hidden effectively, but if disturbed will move rapidly for a short distance, and if possible, they will fly away from the area for quite a long distance. Females are far more aggressive compared to the males, using their heavily spined legs to cause injury to the attacker, and using their wings in a flash display in order to startle the predator. If the female is handled further, she is capable of producing a loud screeching noise; although it is not known how this is done. She is also capable of biting the aggressor, but this is only done in extreme cases of

stress.

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